AS-EPA Summary Comments on Canneries' MZA

Comments are made under the assumption that StarKist Samoa was the sole discharger through the Joint Cannery Outfall (JCO) since September 2009, except for a brief period of limited flow contribution from Samoa Tuna Processors in 2015, and that StarKist will be the sole discharger under foreseeable future scenarios.

1) As a consultant, gdc possesses the qualifications and experience to prepare the MZA document. Dr. Glatzel and Dr. Costa are senior technical scientists, recognized and respected in the fields of water quality and oceanography. They have conducted numerous surface water related studies and extensive compliance activities for canneries and utilities in American Samoa since the 1980s. It should be noted that the business arrangement between **gdc** and StarKist implies that **gdc** works for the best interests of StarKist, and not necessarily for the best interests of Pago Pago Harbor water quality.

2) The MZA should not be considered an exact or precise document. Preparation of the MZA is based on principles of water chemistry, biology, mathematical modeling, field studies, laboratory analyses, and statistical interpretations of analytical data. Separately, each of these areas of scientific application have inherent uncertainty of varying degree. When these scientific applications are combined in preparation of the MZA the degree of uncertainty is compounded. The final degree of uncertainty is indeterminable, but it must be acknowledged as a factor in the MZA document, and should be a factor in AS-EPA and US EPA decisions.

Conclusions drawn by MZA preparers (**gdc**) are based on their professional interpretation. Decisions by MZA reviewers and for NPDES Permit requirements (AS-EPA & US EPA) are also based on professional interpretation. For all parties, interpretations are based on scientific knowledge and understanding, experience, personal observations, judgement, environmental goals, and mandates. US EPA and AS-EPA are mandated to make decisions that are implementable and have greatest potential to ensure environmental protection, but are not economically infeasible. This is the conservative approach, and where uncertainty exists, decisions should favor environmental protection.

Recommendation
As the NPDES authority, it is the purview of US EPA to arbitrate with the discharger (SKS & STP) for the greatest achievable potential for water quality and other environmental goals for Pago Pago Harbor and watershed in American Samoa. US EPA and AS-EPA should be aligned in a conservative approach for arbitration of NPDES Permit conditions.

3) In 2012 StarKist Samoa ceased ocean dumping of high-strength waste. "High-strength" waste refers to the combined waste streams from the pre-cookers + DAF sludge + fish meal operation. These waste streams contain high levels of nitrogen, phosphorus, suspended solids, oil & grease, and potentially ammonia. High-strength waste will have an extreme negative impact on Harbor water quality if discharged through the JCO without adequate treatment. These wastes were historically barged to sea for disposal to eliminate costly in-plant wastewater treatment. Today, in-plant wastewater treatment processes must compensate for cessation of ocean dumping.

Records indicate that since 2012 the StarKist in-plant treatment processes are not adequate to achieve full compliance with current NPDES Permit limitations. This supports that high-strength waste is discharged through the JCO without adequate treatment. Receiving water monitoring data clearly indicates that the StarKist period of non-compliance (2012–present) had a

degradation effect on Harbor water quality. Severely depressed dissolved oxygen (DO) at depth, as shown in receiving water quality monitoring reports, is an indicator of unacceptably high pollutant load on the Harbor.

Depressed DO concentration in a water body is a strong indication of chronic high organic pollutant load. Depressed DO in the Harbor cannot reasonably be attributed to village activity or stream inputs or natural phenomena. The most reasonable conclusion is that when StarKist ceased ocean dumping the in-plant treatment did not provide adequate treatment of high-strength waste, and Harbor water quality degradation is the result.

Although treatment process upgrades are proposed and underway by StarKist, it is not demonstrated that removal efficiencies will achieve full compliance with current NPDES Permit limitations. The efficacy of proposed treatment system upgrades are not yet demonstrated because upgrades are not yet completed.

Recommendation
At this time it is not justified to grant less restrictive limitations as proposed by StarKist (MZA Section 10.3). Moreover, the request for less restrictive limitations is not consistent with the expressed StarKist intent that wastewater treatment system upgrades will achieve current NPDES Permit limitations (MZA Section 2.1 and elsewhere). StarKist Samoa should be requested to explain this inconsistency in intended purpose.

Recommendation
Request StarKist to submit a strategic plan and engineering designs for wastewater system upgrades to support the claim that compliance with current NPDES Permit limitations can be achieved. To date, AS-EPA has not received any plans or designs and is not aware of any that have been submitted to US EPA.

Recommendation
Maintain current NPDES Permit limitations for new permit with option to re-assess when treatment system upgrades are completed, and when DMR data indicates full compliance is achieved, and when receiving water quality monitoring indicates no degradation impact from discharge of StarKist treated effluent. Special attention should be given to DO concentrations in the Harbor water column, following a suitable period of full compliance with NPDES Permit conditions. The return to pre-2012 DO conditions is one desirable outcome. Consistent compliance with Permit conditions as shown on DMRs is also a target outcome.

4) Computer modeling of dilution and plume behavior (MZA Section 7) is not consistent with observed surface conditions in the vicinity of the outfall diffuser, or with reports of near-shore surface conditions from village residents. Depth of water at the JCO diffuser location is approximately 180 ft (55 m). For all model runs (except U16a & U16b) shown in Exhibits 7-2 and 7-4, plume rise is limited to within 30-45 ft (10-15 m) of the surface. However, AS-EPA personnel have made numerous observations of the plume at the surface over a period of many years. Specifically, Peter Peshut (AS-EPA 2000-2008, *NES* 2008- present), has been on the water in the JCO vicinity ~200 times from 2000-2018, and has observed the plume on the surface approximately 20-30 times (Refer to attachment: *Plume Observations – Pago Harbor*). Plume characteristics of color and odor are unmistakably of cannery origin. Since 2014 AS-EPA staff have made similar observations. Residents of Aua and Onesosopo villages have made reports of malodorous and dis-colored water to AS-EPA based on shore-side observations (Refer to attachment: *Photo Documentation)*.

Anecdotal evidence from P. Peshut, AS-EPA staff, and shore-side residents strongly indicates that the JCO plume reaches the surface not infrequently. Observed plume behavior suggests that computer model outputs are not representative of actual conditions of dilution and dispersion. The intermittent and random timing of observations suggest that the plume is at the surface at a greater frequency than actually observed.
Possible explanations (factors) for inaccuracy of plume dispersion/dilution modeling are:

- Ocean current data are outdated (1980s most recent data, methodology outdated)
- Effluent temperature and salinity data may not be representative (COS/STP have not discharged since 2009, except for a brief period in 2015)
- Insufficient receiving water density profile data for model input (limited data set)
- Diffuser ports are not as described for the model (ports may be closed or plugged)
- Influence of reef slope (localized current effects not accounted for).

Recommendation
Plume and dilution modeling as presented in the MZA should not be interpreted as sufficiently representative of actual conditions of plume behavior. The model results should not be accepted to justify dilutions or effluent limitations less restrictive than the current NPDES Permit limitations.

Recommendation
A present-day ocean current study using state-of-the-art instruments and methodology should be conducted.

Recommendation
Evaluation of quantity and quality of available density profile data with respect to sufficiency for model input to achieve desired representativeness, and data-set enhancement as required, are recommended.

Recommendation
Validation of StarKist effluent temperature and salinity is recommended.

Recommendation
Validation of diffuser port status is recommended. Analysis of potential benefits of additional diffuser ports is recommended.
It is likely that initiatives recommended above will improve model output and provide a better representation of actual plume behavior and effluent dilution.

5) The number of required receiving water monitoring stations were possibly reduced successively over the past permit periods (3 or 4 permits, inclusive). Reduced number of stations will reduce the representativeness of analytical data used to describe Harbor water quality. As indicated earlier, Pago Pago Harbor is a large and complex system of biotic and abiotic interactions and interdependence. An inadequate number of monitoring stations may result in representation of water quality that is not supported by sufficient data to achieve sound regulatory decisions. (Also see comment 6 below).

Recommendation

US EPA is recommended to review past NPDES Permits for the American Samoa canneries to determine the extent (if) monitoring stations were reduced since the first permit was issued (*c*. 1990).

6) Data set for receiving water should be considered limited and may not best represent prevailing water quality conditions in Pago Pago Harbor. Although the data set appears cumulatively large (1980s – present), water quality investigations are conducted only 2 times yearly, for only 4-7 stations in the JCO vicinity, and at only 3 depths. This should be considered a limited sampling design for the large and complex natural system of Pago Pago Harbor.

Evidence that the data set is limited is shown by the relatively large ***standard deviation*** calculated for analytical results for numerous parameters. In statistics, the standard deviation is used to quantify the amount of variation or dispersion of a set of data values. A small standard deviation (compared to the calculated average) indicates that the data points tend to be close to the true average of the set. This indicates that the data most likely represents near-true average conditions. A relatively large standard deviation (compared to the calculated average) indicates that the data points are spread out over a wide range beyond the average. One reason for a large standard deviation is that there are too few data points to accurately represent the average conditions. Using average values with large standard deviations for water quality assessments could result in erroneous regulatory decisions that could result in long-term chronic water quality degradation.

Recommendation
The sampling design for the receiving water monitoring should be subjected to an analysis of statistical power, and/or ability to adequately characterize Harbor water quality. At present, there is no way to determine if the sampling program adequately characterizes the impact of StarKist effluent on Pago Pago Harbor. It appears that instrumentation and laboratory analyses are of sufficient scientific integrity and rigor, but this does not preclude that the number of sampling events, stations, and depths, are too few.

Recommendation
Based on findings from the previous recommendation, an improved sampling design that includes appropriate number of monitoring stations, number of sampling depths, and number of sampling events, as required, should be prepared to better characterize water quality of Pago Pago Harbor in the vicinity of the JCO. The sampling design should be the basis of the receiving water quality monitoring requirements of the new NPDES Permit.

7) Industry sometimes claims economic hardship to challenge US EPA decisions for NPDES Permit conditions.

Recommendation
Economic impact on StarKist as a result of NPDES Permit conditions (present-day or final proposed) should be requested from StarKist if US EPA proposed Permit conditions are challenged. Economic analysis should be provided at a level of detail that allows US EPA and AS-EPA to determine overall impact on StarKist profitability. Costs should be presented on the basis of annual expenditures for compliance. Important cost factors include but are not necessarily limited to:

- Salary obligation (wages and benefits) for required compliance staff

- Staff training requirements
- Personal protective equipment
- Sampling equipment and supplies (other than laboratory)
- Laboratory equipment and supplies
- Costs for procurement/shipping of equipment and supplies
- Costs for equipment maintenance
- Contract laboratory
- Consultant services

Costs for compliance with NPDES Permit conditions should be presented as a total dollar value, and also as a percentage of the American Samoa StarKist facility annual profit. Costs should also be presented on a per can basis compared to profit per can. It is understood that costs and profits vary over time, and that averages will likely be used in calculations.